ALABAMA PRISON ARTS + EDUCATION PROJECT

THE WARBLER

AN EDUCATIONAL WEEKLY

ISSUE 95

FEBRUARY 2, 2022

Dear Student, Artist, Thinker,

In all honesty, many people find the **Arctic and Antarctica** to be boring subjects, but I wholeheartedly disagree. They seem to be just giant pieces of ice, but they both influence all of the climate processes that we know of today. Even though they seem devoid of life, they both have species endemic (indigenous) to them such as Antarctica's penguins or the Arctic's polar bears and walruses. Life simply functions differently in those places, which is absolutely stunning. Thinking about these places reminds me that there is always more to discover even within my immediate environment. I'm a fan of chemistry as well, so the fact that such a massive block of ice is able to sit on top of water when normally the solid would sink is fun to ponder.

Something that makes the Arctic special is the way that water behaves in its cold temperatures. Water is what we would call a polar molecule which means it can make weak bonds with other molecules. When it gets cold, the molecules set themselves into a crystalline shape where the molecules are farther apart than liquid water. This means that ice is less dense than water and that it will float. This fact only leads to more questions. How do icebergs form? What lies under the massive blocks of ice? Scientists have only recently been able to investigate this because of modern technology. There are ginormous lakes sitting under them, and they're only able to exist because of the immense pressure placed by the ice. Diamond dust, which is another name for the ice crystals that precipitate out of the air in extremely cold temperatures, floats through the air in Antarctica, leading to beautiful phenomena such as sun dogs, which is a nickname for bright spots of light forming a halo around the Sun.

The uniqueness of these areas is my favorite thing about them. Life itself is just different there, physics and chemistry create otherwise unseen phenomena, and they may hold answers pertaining to the origins of life. I hope you enjoy this week's edition of *The Warbler* as you learn about some of the least explored regions of the world.

Taylor and the APAEP Team

WORDS INSIDE

FOUND INSIDE "UNCOVERING LAKE VOSTOK ..."

accumulates | gather together or acquire an increasing number or quantity of

irresistible | too attractive and tempting to be resisted

crustacean | an arthropod of the large, mainly aquatic group Crustacea, such as a crab, lobster, shrimp, or barnacle

FOUND INSIDE "DINOSAURS NESTED IN ..."

hatchling | a young animal that has recently emerged from its egg

venture | a risky or daring journey or undertaking

migrate | move from one region or habitat to another according to the seasons

"The world cannot live without the Arctic; it affects every living thing on Earth and acts as a virtual thermostat, reflecting sunlight and cooling the planet."

PHILIPPE COUSTEAU JR. // French aircraft pilot, photographer, and author

PALEONTOLOGY

Dinosaurs Nested in the High Arctic

BY RILEY BLACK | *Smithsonian Magazine* | June 24, 2021

Even during the Cretaceous, roughly 70 million years ago, the High Arctic saw months of darkness. That's offered paleontologists a longstanding puzzle. Various dinosaur species—from tyrannosaurs to armored dinosaurs—have been found in rocks from around this age along Alaska's North Slope and certainly had to contend with the long winter nights. Did these dinosaurs migrate with the seasons, paleontologists have wondered, or did they stay in place through the harshest season?

The answer has come from a surprising source. During decades of explorations and excavations in Alaska's Prince Creek Formation, paleontologists have slowly gathered a collection of bones from very young dinosaurs—and not just one species, but many. Described in Current Biology today, these tiny fossils speak volumes about the dinosaurs of the High Arctic. Instead of migrating to warmer regions to raise their young, polar dinosaurs stayed in ancient Alaska year-round and raised their offspring there.

Finding the remains of any hatchling or juvenile dinosaurs is a reason for paleontologists to celebrate. These fossils are very rare. Baby dinosaurs are rarely preserved in the fossil record, likely owing to their small size and the fact that young dinosaurs were likely the favored prey of large carnivores.

"The discovery of these tiny bones and teeth was no small accomplishment," Druckenmiller says. Searching for fossils in the Prince Creek Formation is not like walking the rocky exposures of Montana or Utah. Alaska's famous dinosaur-bearing formation is only exposed as cliffs along the Colville River, and in this setting Druckenmiller and colleagues looked for thin layers of rock that might contain accumulations of microfossils, or spots where teeth, small bones and other fossil tidbits have been preserved together. "We didn't expect to find babies, much less remains of seven different species that clearly reproduced in the Arctic," says Druckenmiller.

The discovery that most of the known dinosaur groups from the Prince Creek Formation nested and started their lives as hatchlings in the High Arctic resolves the question of whether Alaska's ancient dinosaurs stayed in place or migrated with the seasons. The hatchlings and infants wouldn't have been able to travel long distances, after all, and so they stuck it out through the harsh months. Other fossil finds, such as a juvenile raptor announced last year, have added evidence to the same idea, with the new paper providing the strongest evidence yet that Alaska's dinosaurs stayed year-round.

Up until now, fossils of young dinosaurs from Alaska have been of small species. Paleontologists still wondered whether the larger species, such as the shovel-beaked hadrosaurs, would have ventured away from Cretaceous Alaska in the cold months. But finding the infants of large species, as well as small ones, hints that the whole dinosaur community remained in the High Arctic through the year. "Our baby dinosaurs are not the first evidence to support the idea of them being year-round denizens, but I'd argue it is some of the most compelling evidence to date," says Druckenmiller.

Baby dinosaur bones and teeth from the Prince Creek Formation in northern Alaska

Image by Current Biology

The question now is how the likes of the horned dinosaur and the tyrannosaur survived the cold and dark months. Even though the area was a bit warmer than it is today, the fact that paleontologists haven't found turtles, crocodiles, amphibians or other "cold-blooded" animals indicates that this place truly could get chilly. From dinosaur growth rates, bone tissue structure and other clues, paleontologists know that dinosaurs had elevated body temperatures. This no doubt helped dinosaurs make it through the cold months.

How dinosaurs navigated the harsh polar winters has major implications for their biology. "The residency of dinosaurs in the Arctic must have had impacts on their growth, diets and senses," Funston says. Some studies of how dinosaurs grew, such as the horned dinosaur, indicate that polar dinosaurs had to grow rapidly in the warm months and stopped growing during the cold ones—creating rings in their bones, similar to tree rings—but that's just the tip of the paleobiological iceberg. ●

Scientists excavate baby dinosaur fossils from above the Arctic Circle on the banks of the Colville River.

Photo by Kevin May

Edited for space and clarity

GEOPHYSICS

Uncovering Lake Vostok, Hidden Under 2 Miles of Antarctic Ice

BY MARK MANCINI | howstuffworks | May 25, 2021

53 million years ago, Antarctica was a forested wilderness, a lush environment where palm trees took root. Now, more than 97 percent of the world's southernmost continent is covered by ice.

The magnificent ice sheet that blankets Antarctica holds 6.4 million cubic miles (27 million cubic kilometers) of frozen water. From top to bottom, it's over 2.2 miles (3.5 kilometers) thick in some places.

More than 379 "subglacial lakes" are caught between Antarctic bedrock and the ice sheet. The lakes retain liquid water, despite the miles of frozen H2O up above them. Scientists have learned they're often interconnected as well.

Lake Vostok is the biggest of the bunch. Roughly the size of North America's Lake Ontario, the buried landmark has inspired curiosity and controversy for decades.

A Legacy of Exploration

On Jan. 27, 1820, Fabian Gottlieb von Bellingshausen — then a captain in the Russian Imperial Navy — made the first recorded sighting of the Antarctic continent. He'd been leading an expedition whose flagship was called "Vostok," the Russian word for "east."

The USSR later tipped its hat to the man. About 800 miles (1,300 kilometers) from the geographic South Pole, there's a (very remote) research facility the Soviets built in 1957. In honor of Bellingshausen's adventure, it was named Vostok Station.

While reviewing seismic data that was gathered in the 1950s, Russian geographer Andrey Kapitsa began to suspect there might be a huge liquid lake hiding under the East Antarctic Ice Sheet, somewhere around Vostok Station.

Proof was a long time coming.

Scientists can use penetrating radar to measure an ice sheet's thickness. First, high-energy radio waves are sent through glaciers, ice sheets or ice caps. If any echoes bounce back, they might reveal important info about the frozen water's structural makeup.

More than 2 miles, or nearly 4 kilometers, of ice separate Lake Vostok (as it's come to be known) from the surface. Human hands have never touched it, but seismometers and ice-penetrating radar have given us a decent picture of the lake.

We know it's got an elongated shape. Even though Lake Vostok is around 155 miles (250 kilometers) in length, it's only 31 to 50 miles (50 to 80 kilometers) wide. There's both a northern and a southern basin. Experts say the lake is up to 2,600 feet (800 meters) deep at certain points. And it holds something like 1,300 cubic miles (5,400 cubic kilometers) of liquid water.

Furthermore, Lake Vostok has its very own island and may experience tides.

All this is quite interesting, but it begs a fundamental question. How can any lake — big or small — persist underneath an expanse of ice taller than any skyscraper without freezing solid?

Subglacial lakes need sources of heat. Sometimes, the Earth itself may provide it.

Our planet releases geothermal energy. This heat can radiate upward and melt glacial ice that's made contact with bedrock. Liquid water then accumulates in valleys and other depressed areas on the rocky surface.

Weird as it might sound, some ice sheets provide heat, too. Ice will naturally melt under the right amount of pressure. And a really thick, really heavy ice sheet is going to put lots and lots of pressure on the water molecules at its base.

Lake Vostok's prehistoric origins are a little murky, but for the past 15 to 20 million years (or so), the lake's been covered by ice.

The Search for Life in the Lake

Back in 1999, microbes were found inside ice samples collected just above Lake Vostok. The ice in question may have once been water from the lake's surface which — at some point — froze to the overhanging glacier.

A 2013 study discovered more than 3,000 "unique gene sequences" in subsurface ice associated with Lake Vostok. Nearly half of this genetic material was identifiable; around 94 percent came from bacteria. The authors said they'd also found evidence of more complex organisms, like fungi and small crustaceans.

Critics of the 2013 paper worried that the drilling tools used to gather these ice samples might have been contaminated.

Regardless of potential flaws in previous research, exploring Lake Vostok and other subglacial environments could teach us a thing or two about the possible living conditions on some faraway moons — like Jupiter's Europa or Enceladus of Saturn. Both worlds have liquid oceans underneath shells of ice, making them irresistible targets in humanity's search for extraterrestrial life. ●

"Even in our day, science suspects beyond the Polar seas, at the very circle of the Arctic Pole, the existence of a sea which never freezes and a continent which is ever green."

HELENA BAVATSKY
// Russian author

MATHEMATICS

Sudoku

#189 PUZZLE NO. 268076

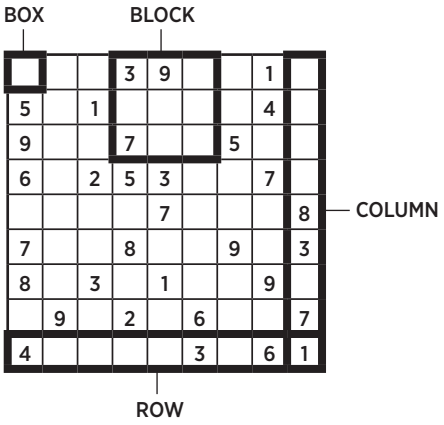
		5	2			1		
					7	6	9	
7	1							
			4	1				3
	4			8				
			3					
3			7				8	9
	6		8		5		7	
		2						4

#190 PUZZLE NO. 9768161

				2	9	3		7
7		3	5		6			
4								9
3		7				8		
		8	2			1	5	
	1	5						
2	6					7		
				8	4			
								1

SUDOKU HOW-TO GUIDE

1. Each block, row, and column must contain the numbers 1–9.
2. Sudoku is a game of logic and reasoning, so you should not need to guess.
3. Don't repeat numbers within each block, row, or column.
4. Use the process of elimination to figure out the correct placement of numbers in each box.
5. The answers appear on the last page of this newsletter.



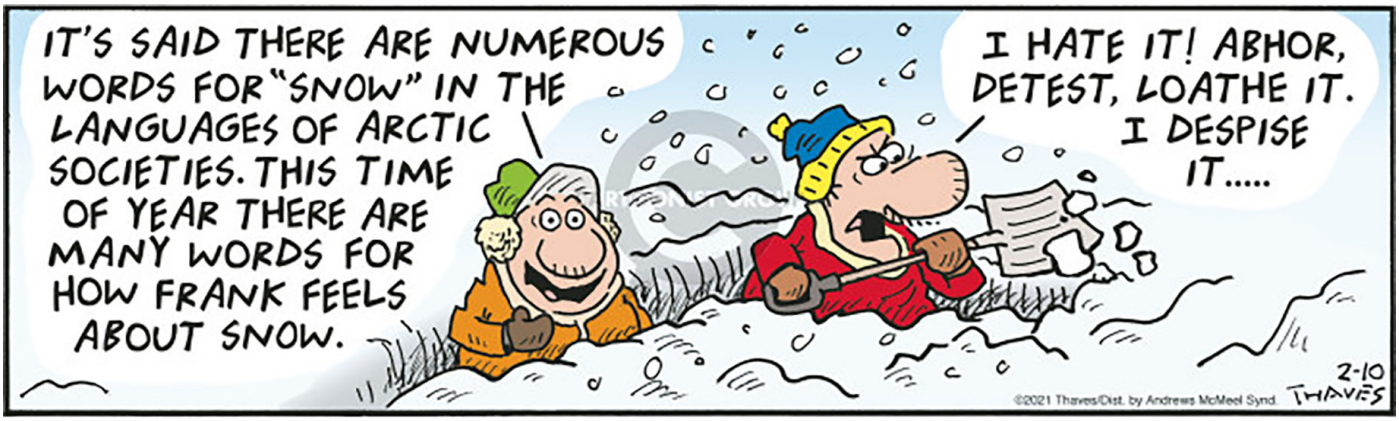
What the example will look like solved

2	4	8	3	9	5	7	1	6
5	7	1	6	2	8	3	4	9
9	3	6	7	4	1	5	8	2
6	8	2	5	3	9	1	7	4
3	5	9	1	7	4	6	2	8
7	1	4	8	6	2	9	5	3
8	6	3	4	1	7	2	9	5
1	9	5	2	8	6	4	3	7
4	2	7	9	5	3	8	6	1

"The fact that the Arctic, more than any other populated region of the world, requires the collaboration of so many disciplines and points of view to be understood at all, is a benefit rather than a burden."

BRUCE JACKSON // American documentary filmmaker and author

Icons from the Noun Project



Idiom

"When hell freezes over"

Meaning Impolite way of saying "it will never happen"; Impossible

Origin This expression was first used in the 19th Century, Middle American English. It belongs to a category of hell idioms that can be described as small, all describing hell as a place that would remain hot for all of eternity. Hell is supposed to be the hottest place in the whole universe, so the chances that its temperature would drop to 0 °C or 32 °F is zero to none.

The first recording of this saying appeared in print in 1919. For F. Scott Fitzgerald and P.G Wodehouse, it was their favorite expression as they often ended their letters with "Yours till hell freezes over. Another recorded use was in 1930, in the book The Civil War by Shelby Foote when a confederate soldier at Gettysburg said to his superior:

"We'll fight them sir, till hell freezes over, and then sir, we will fight them on ice!"

A pictorial depiction of hell freezing over can be found in Dante Alighieri's "The Divine Comedy." In the book, there is a woodcut of the devil in the lowest rung of hell frozen in ice up to his waist giving an illusion of hell as a sea of fire and ice.

Source: www.theidioms.com

DID YOU KNOW?

Polar bears are only found in the Arctic and are **Earth's largest predators**. The largest polar bear ever recorded was 3.5 meters tall (11.5 feet) and weighed over 1000 kilograms (2205 pounds).

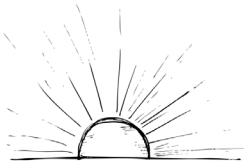
Iceland is a literal hotspot of volcanic and geothermal activity. Known as the **land of fire and ice**, over the past two centuries 30 post-glacial volcanoes have erupted, and natural hot water supplies most of the population with economical, sustainable heating.

While **84% of Greenland** is an icy wonderland covered by the second largest ice cap on earth, in summer the lower valleys spring colourfully to life. In the lowland valleys you can see some of the 500 delightful flowering plant, fern and grass species to be found in Greenland, including Greenland's national flower Niviarsiaq, commonly known as broad-leaf fireweed.

The **Arctic Ocean** is the smallest of Earth's 5 major oceans but is still almost twice the size of Australia.

Source: www.aurora-expeditions.com/blog/10-arctic-facts/

MANY KEEN KAYAKERS KNOW THE ARCTIC AS THE **ORIGIN OF MODERN KAYAKING**. GREENLAND'S SKIN-ON-FRAME KAYAKS (QAJAKS) DATE BACK TO THE 16TH CENTURY.



WHEN THE SUN RISES OVER THE ARCTIC CIRCLE IN JUNE IT **DOESN'T SET FOR 30 WHOLE DAYS**. THE FARTHER NORTH IT GETS, SUMMER DAYS GET LONGER. AT THE NORTH POLE IN THE SUMMER, THE SUN DOESN'T GO UNDER THE HORIZON FOR 187 DAYS.

THE SCIENTIFIC NAME FOR **WALRUS**, ODOBENUS ROSMARUS, MEANS "TOOTH WALKING SEA HORSE." WALRUSES ARE VERY SOCIAL ANIMALS, WITH A RIGID HIERARCHY BASED ON TUSK LENGTH, BODY SIZE AND DISPLAYS OF AGGRESSION. IN THE WORLD OF THE WALRUS, POWER CAN BE FLEETING. A WALRUS THAT BREAKS A TOOTH ON THE BATTLEGROUND CAN QUICKLY LOSE ITS SOCIAL STANDING!

ART + CULTURE

Snowy Owl Near Ocean Shores

BY DUANE NIATUM

A castaway blown south from the arctic tundra
sits on a stump in an abandoned farmer's field.
Beyond the dunes cattails toss and bend as snappy
as the surf, rushing and crashing down the jetty.

His head a swivel of round glances,
his eyes a deeper yellow than the winter sun,
he wonders if the spot two hundred feet away
is a mouse on the crawl from mud hole
to deer-grass patch.

An hour of wind and sleet whips the air,
nothing darts or passes but the river underground.
A North Pole creature shows us how to last.
The wind ruffles his feathers from crown to claw

while he gazes into zeroes the salt-slick rain.
As a double-rainbow before us arcs
sky and owl, we leave him surrendering
to the echo of his white refrain.

Duane Niatum was born Duane McGinniss in Seattle, and he changed his name to one of his S'Klallam tribal ancestors early in his career as a poet. He earned a BA from the University of Washington, where he studied with Theodore Roethke and Elizabeth Bishop, an MA from Johns Hopkins University, and a PhD in American culture from the University of Michigan. He has been nominated for the Pushcart Prize four times for this work. Niatum still lives in Seattle and taught at numerous Seattle-area high schools and universities such as The University of Washington, Western Washington University, and the University of Michigan.

WRITING PROMPT

Although writing is usually dictated by life (the plot of characters, the descriptions of living things, vivid dialogue, etc.), the Arctic does not draw from that source. Most of the Arctic still remains largely uninhabitable aside from some animal and collection of indigenous individuals. For this week write about a place that is not defined by its living creatures, whether that be the Arctic or some other invented location.

Word Search

A	U	N	I	H	N	U	E	E	S	R	C	P	E
S	E	C	N	A	T	W	Y	G	L	A	N	C	E
I	A	N	S	R	A	W	T	E	N	U	R	T	S
P	E	N	G	W	H	D	S	H	A	E	I	H	N
N	W	U	W	I	N	T	E	R	I	N	Y	W	E
R	R	S	T	T	P	D	E	I	R	E	I	I	A
I	H	E	G	N	U	A	S	T	A	A	Y	A	S
E	R	U	R	N	C	M	A	U	E	S	S	S	R
L	P	H	D	P	E	O	N	N	Y	N	S	S	S
E	R	I	O	R	S	U	R	D	A	C	W	N	P
T	T	N	E	P	P	S	A	R	S	N	R	A	N
N	W	N	P	E	I	E	I	A	P	S	A	P	E
P	M	W	A	H	H	I	N	A	N	G	S	P	N
H	T	I	P	S	W	R	I	N	H	A	U	Y	N

WHITE
WINTER
MOUSE
RAIN
GLANCE
TUNDRA
WHIPS
AIR
SNAPPY
SUN

NATURE

As Arctic Sea Ice Retreats, Orcas Are on the Move, Spurring Changes in the Food Chain

Acoustic recordings reveal the marine behemoths are moving into once icy areas, which causes competition for resources with other species

BY RASHA ARIDI | *Smithsonian Magazine* | December 3, 2021

Orcas are found all over the globe—from the warmer, tropical waters near the equator to the frigid North and South poles. Their range in the Arctic has usually been limited because venturing into ice-covered areas comes with the risk of getting trapped beneath the ice. But that could be changing soon, Chen Ly reports for *New Scientist*.

As sea ice melts because of climate change, orcas—also known as killer whales—are venturing into once-icy waters. Their expansion into the Arctic has cascading effects on the food web, other species' behavior and Indigenous communities, Corinne Purtill reports for the *New York Times*.

"The September Arctic sea ice minimum is declining at an average rate of 13% per decade, when compared to values from 1981 to 2010," Brynn Kimber, research scientist at the University of Washington and the National Oceanic and Atmospheric Administration, says in a press release. "Killer whales are being observed in the Chukchi Sea (in the Arctic Ocean) in months that were historically ice covered and more consistently throughout the summer."

Kimber recently described her team's findings at a meeting of the Acoustical Society of America.

Four different audio recorders placed in different regions of the northwestern Arctic collected eight years' worth of acoustic data, allowing Kimber and her team to eavesdrop on the sea creatures. By identifying the clicks, calls and whistles of cetaceans like whales and dolphins, the team could identify which species are present in the region, where they reside and how many individuals there are, *New Scientist* reports.

A few years ago, Kimber was analyzing the audio recordings when she heard the shrill call of orcas, she tells the *Times*.

"When I started the job my mentor told me, 'You won't see killer whales this far north,'" she says. "Where I would see absolutely none in previous years, in later years I was seeing more and more."

Analysis revealed that orcas were visiting the Bering Strait regularly in summer. Not only were they becoming regulars in the region, but pods arrived earlier in 2019 than they did in 2012, likely due to warming temperatures and the melting ice, *New Scientist* reports.

Furthermore, as apex predators, orcas are at the top of the food chain and feast on fish, seals and even other cetaceans like bowhead whales and belugas. As orcas move in, Indigenous communities and scientists have observed that more bowhead whale carcasses have been left tattered in the seas, the *Times* reports.

"Killer whales are really intelligent," Cory Matthews, a researcher with Fisheries and Oceans Canada, tells the *Times*. "If a new area opens up, they can get in there maybe within the next year and exploit a prey population that could be perhaps really slow to respond to those changes."

But just the orcas' presence is enough to tip the ecosystem's balance as prey species adjust their behavior to hide amongst the sea ice where they're safer, but with depleting ice, prey species are more exposed. This shift could affect breeding success, since adults could be more stressed and have fewer resources to raise healthy offspring, which could affect population size later on, Alison Bosman reports for *Earth.com*.

Four different audio recorders placed in different regions of the north-western Arctic collected eight years' worth of acoustic data, providing a sneak peek into the lives of cetaceans.

Photo by Christopher Michel

Around 40 Indigenous communities reside in the region, and species like narwhals, seals and belugas are key parts of the diet and culture, which could decline as climate change continues to wreak havoc on the poles.

"With this ice going away, there's going to be more and more changes in the area. I think this [case] is just one of many," Kimber tells *New Scientist*. "The different ecosystem shifts we might see and all the various impacts it could have is important to think about." ●

ANTHROPOLOGY

The Arctic's Future Population Will Likely Be More Urban, More Aged — and Only Slightly Bigger

BY YERETH ROSEN | *Artic Today* | February 3, 2020

The Arctic's population is expected to remain stable through the middle of the century, but there are likely to be wide differences in how residents are distributed around the North, a new study says.

By the middle of the 21st century, the Arctic population is expected to increase by only 1 percent, compared to a global population that is expected to swell from 7.4 billion in 2015 to 10 billion in 2055, according to the study by Timothy Heleniak, a researcher based at the Stockholm-based Nordic research center Nordregio.

In some ways, the study projects that Arctic populations will move a bit closer to the profile of the general global population — becoming more urbanized, older and more female.

But Heleniak, a geographer specializing in Arctic region demographics and economic development issues, said by email that despite that shift, there are some caveats. Arctic settlement patterns "will always remain unique with quite dispersed populations and large distances between population centers," he said. "Transport links among settlements in the Arctic are often lacking or are few, unlike populations in the non-Arctic portions of these states."

There are about 10 million people living in the Arctic, under the expansive definition used in Heleniak's study, which is published in the journal Polar Geography. The definition includes, for example, the entire state of Alaska and Canada's entire Yukon and Northwest Territories, folding in northern areas that are well south of the Arctic Circle but considered to have an Arctic identity.

Iceland is expected to have the highest growth rate, with a population increasing by about a third by 2066, according to a mid-scenario, said the study. But Arctic Russia, which residents have fled in large numbers since the breakup of the Soviet Union, is projected to continue losing people through 2036, albeit at a more moderate rate of 2.5 percent, the study said.

Iceland's population has been growing at a fast clip — 18 percent since 2000 — thanks to a high birth rate and net in-migration, according to the study. Future growth is expected to be concentrated in the nation's capital region, and by the 2060s nearly four in five of Icelanders expected to live there, according to the study. In contrast, Iceland's more rural and outlying regions are expected to lose residents, even as the nation's total population grows.

The populations of Arctic regions of Sweden, Norway and Finland are projected to grow only modestly. Collectively, those nations' Arctic regions are forecast to see population growth of about 3 percent by 2040, a slight decline from the 4 percent growth seen since 1990. Demographic patterns have been uneven in different regions, though, and that unevenness is expected to continue. Arctic Norway is different from other Arctic regions in one way — the residents there are, on average, older than those in non-Arctic Norway.

Tromsø, Norway — one of the largest cities in the Arctic — has a dense downtown core. Like other parts of the world, the Arctic will see a trend toward urbanization in the 21st century.

Photo by Krestia DeGeorge

No real growth is expected in Greenland and the Faroe Islands, the study said. Greenland has had steady out-migration that is balanced by a birth rate that has kept the population flat from 1990 to 2016, the study noted. As Greenland gains more autonomy in coming years, fewer people are expected to move there from Denmark, a phenomenon that will also affect the total population. In the study's forecast period, Greenland is expected to have an overall population decline.

In the Faroe Islands, the ups and downs of the fishing industry have made for population volatility in the past, but the region may have reached its carrying capacity, the study says. A slow increase in population is expected until 2029, and then a gradual decline after that, resulting in a population of just under 49,000 by 2055, according to the study.

An outlier is Arctic Russia. Overall, it lost a fifth of its population after the breakup of the Soviet Union, the study notes, declining from 9.4 million in 1989 to 7 million

WORD PLAY A Rebus puzzle is a picture representation of a common word or phrase. How the letters/images appear within each box will give you clues to the answer! For example, if you saw the letters "LOOK ULEAP," you could guess that the phrase is "Look before you leap." *Answers are on the last page!*

in 2018. Losses were most in the remote eastern regions. The Magadan region lost nearly two-thirds of its population, and population losses were even greater in the Chukotka region, the study said.

One striking trend is the low male-to-female ratio, something that separates Arctic Russia from the world's other Arctic regions, which generally have more men than women.

In 1989, at the end of the Soviet period, the ratio was 100.9 males to every 100 females in the Russian Arctic. By 2017, that ratio had decreased to 92.3 males to every 100 females, the study said. The main cause for the decline is a reduced life expectancy for Russian men, a nationwide phenomenon. Heleniak has previously analyzed that pattern in the Russian Arctic. Only about a quarter of the post-Soviet era male population loss in the Russian Arctic can be attributed to out-migration, he said in a study published last year titled "Where did all the men go?" The rest is attributable to premature deaths, with cardiovascular disease, murder, suicide and accidents as prominent causes, he said in that study, published in the journal Polar Record.

But the future outlook for Arctic Russia appears not quite as grim. Overall, the population is expected to keep declining through the 2030s, though at a slower rate, but the male-female ratio will inch a little closer to parity, according to projections in Heleniak's new study. Three of the 11 Russian Arctic regions are expected to gain residents in the future — and that includes the beleaguered, poverty-stricken Chukotka region.

Heleniak said the projections are based on information from Russia's demographic agency, Rosstat. He said he does not know the exact reasons for Rosstat's belief that Chukotka's population increase. "I doubt that living conditions in Chukotka will improve considerably in the near future," he said. It could be that the Chukotka population had fallen so low "it could only go up," he said.

In Russia and around the Arctic, the trend toward urbanization has some social and economic implications, Heleniak.

"There will certainly be effects from the outmigration from smaller Arctic settlements. Many smaller settlements might completely disappear. This has been the case across the Arctic, especially in Russia," he said. "It becomes difficult and expensive for governments to maintain service provision when populations become so small. There is also a gender dimension as it is usually women who leave these smaller settlements in much larger numbers than men as they move up the urban hierarchy, leaving quite high male sex ratios in many smaller Arctic settlements."

Over the last three years, the birth rate in Alaska dropped, for reasons that are yet unclear, Howell said. It is too early to say whether Alaska will follow the trend of the nation as a whole, which has had a notable drop-off in birth rates starting about 2007, he said. For Alaska, "It's only really been the last three years. It's kind of hard to say that three years is a trend," he said.

As for out-migration, there are some economic explanations, said Neil Fried, a senior research economist at the Alaska Department of Labor and Workforce Development. While Alaska's recent economic recession appears to have ended, the state has had the highest unemployment rate of all U.S. states, a big contrast with the 10 years of economic expansion in the rest of the country, he noted.

When times are good in the south, there is less incentive for people to move north, he said. "People are staying closer to home, which means that fewer are choosing to move to Alaska," Fried said. ●

Edited for space

RANDOM-NEST

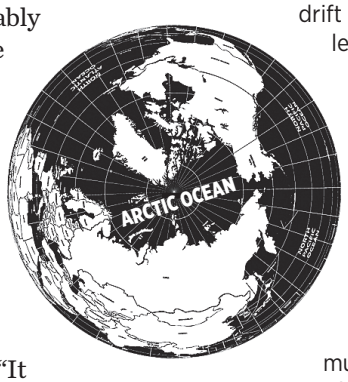
Arctic vs. Antarctic

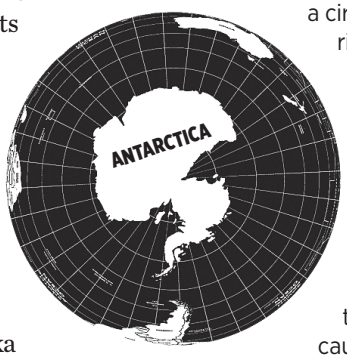
NATIONAL SNOW & ICE DATA CENTER | APRIL 3, 2020

Geography | Sea ice differs between the Arctic and Antarctic, primarily because of their different geography. The Arctic is a semi-enclosed ocean, almost completely surrounded by land. As a result, the sea ice that forms in the Arctic is not as mobile as sea ice in the Antarctic. Although sea ice moves around the Arctic basin, it tends to stay in the cold Arctic waters. Floes are more prone to converge, or bump into each other, and pile up into thick ridges. These converging floes makes Arctic ice thicker.

Minimum and maximum sea ice cover for the Arctic and Antarctic

The Antarctic is almost a geographic opposite of the Arctic, because Antarctica is a land mass surrounded by an ocean. The open ocean allows the forming sea ice to move more freely, resulting in higher drift speeds. However, Antarctic sea ice forms ridges much less often than sea ice in the Arctic.





Thickness | Because sea ice does not stay in the Antarctic as long as it does in the Arctic, it does not have the opportunity to grow as thick as sea ice in the Arctic. While thickness varies significantly within both regions, Antarctic ice is typically 1 to 2 meters (3 to 6 feet) thick, while most of the Arctic is covered by sea ice 2 to 3 meters (6 to 9 feet) thick. Some Arctic regions are covered with ice that is 4 to 5 meters (12 to 15 feet) thick.

Patterns of Ice Extent | The pattern of Antarctic maximum sea ice is roughly symmetric around the pole, forming a circle around Antarctica. In contrast, the Arctic is asymmetric, with much more ice in some longitudes than others. Ocean currents and winds explain these differences.

Snow Cover over Sea Ice | Because the Arctic Ocean is mostly covered by ice and surrounded by land, precipitation is relatively rare. Snowfall tends to be low, except near the ice edge. Antarctica, however, is entirely surrounded by ocean, so moisture is more readily available. Antarctic sea ice tends to be covered by thicker snow, which may accumulate to the point that the weight of snow pushes the ice below sea level, causing the snow to become flooded by salty ocean waters.

Images from worldatlas.com

Edited for space and clarity

HOW TO DRAW A MAGELLANIC PENGUIN

Words of Encouragement

The arctic has always been a landscape literally unlike any other. With a freezing, barren climate, it is only able to be hospitable to around 4 million people, a miniscule population considering the 5.4 million square miles that the Arctic covers. And yet, while not providing a direct source of help in some regards such as housing and sustainability, the Arctic plays an indispensable role in our world. Its sea ice acts as a moderator to sustain the global climate, and deposits of oil and natural gas have been able to be extracted from the permafrost. Many animals unique to this region such as polar bears or arctic foxes solely have this landscape as a sustainable place for survival.

Sylvia Earle, an American marine biologist and oceanographer said on the Arctic: "For humans, the Arctic is a harshly inhospitable place, but the conditions there are precisely what polar bears require to survive — and thrive. 'Harsh' to us is 'home' for them. Take away the ice and snow, increase the temperature by even a little, and the realm that makes their lives possible literally melts away."

As articulated by Earle, the Arctic serves to us all a reminder on the importance of perspective — of looking past the tundra into who and what inhabits it. To always be striving to learn more about the world around us and finding a sense of unity and community in this learning. We hope that you've been able to find some of that unity in the pages of this edition of *The Warbler* this week. As always, we wish you luck on your journey and hope for all the best in your educational goals.

Julia and the APAEP team

1061 Beard-Eaves Memorial Coliseum // Auburn University, AL 36849

"The Arctic has huge glaciers, frozen waterfalls and floating ice. This is scenery on which man has left no mark, which has stayed unchanged for centuries, wild, bleak, hauntingly beautiful; it is a part of God's creation we have made no effort to tame."

ANN WIDDECOMBE // British politician

Answers

SUDOKU #189

6	9	5	2	4	8	1	3	7
2	3	4	1	5	7	6	9	8
7	1	8	6	9	3	4	5	2
5	8	7	4	1	6	9	2	3
9	4	3	5	8	2	7	1	6
1	2	6	3	7	9	8	4	5
3	5	1	7	6	4	2	8	9
4	6	9	8	2	5	3	7	1
8	7	2	9	3	1	5	6	4

SUDOKU #190

1	5	6	8	2	9	3	4	7
7	9	3	5	4	6	2	1	8
4	8	2	3	7	1	5	6	9
3	2	7	1	6	5	8	9	4
6	4	8	2	9	7	1	5	3
9	1	5	4	3	8	6	7	2
2	6	4	9	1	3	7	8	5
5	3	1	7	8	4	9	2	6
8	7	9	6	5	2	4	3	1

Rebus Puzzle

Page 8

1. The fat's on the fire
2. In between jobs
3. Make ends meet

Send ideas and comments to:

APAEP
1061 Beard-Eaves
Memorial Coliseum
Auburn University, AL 36849

UNTIL NEXT TIME ...